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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 10 April 2001 (10.04.01)	
International application No. PCT/GB00/03055	Applicant's or agent's file reference PRW/P54514WO
International filing date (day/month/year) 08 August 2000 (08.08.00)	Priority date (day/month/year) 14 August 1999 (14.08.99)
Applicant SAMSON, Ilan	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 03 March 2001 (03.03.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer S. Mafla Telephone No.: (41-22) 338.83.38
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PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 10 AUG 2001

PCT

Applicant's or agent's file reference PRW/P54514WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/03055	International filing date (day/month/year) 08/08/2000	Priority date (day/month/year) 14/08/1999
International Patent Classification (IPC) or national classification and IPC A47G19/22		
Applicant ROYAL INDUSTRIES (THAILAND) PLC et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none">I <input checked="" type="checkbox"/> Basis of the reportII <input type="checkbox"/> PriorityIII <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicabilityIV <input type="checkbox"/> Lack of unity of inventionV <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statementVI <input type="checkbox"/> Certain documents citedVII <input checked="" type="checkbox"/> Certain defects in the international applicationVIII <input type="checkbox"/> Certain observations on the international application		
Date of submission of the demand 03/03/2001	Date of completion of this report 08.08.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Reichhardt, O Telephone No. +49 89 2399 2485 	

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/03055

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-6 as originally filed

Claims, No.:

1-12 as originally filed

Drawings, sheets:

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/03055

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	9,10,12
	No:	Claims	1-8,11
Inventive step (IS)	Yes:	Claims	
	No:	Claims	9,10,12
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03055

1. The application does not satisfy the criterion set forth in Article 33(2) PCT because the subject-matter of independent claim 1 is not novel with regard to the teaching of document US-A-3 102 651.
2. Likewise, the additional features as defined in dependent claims 2 - 8, 11 are disclosed in document US-A-3 102 651 and as such do not add novel matter.
3. The additional features as defined in dependent claims 9, 10, 12 come within the scope of the customary practice followed by persons skilled in the art and as such do not add inventive matter (Article 33(3) PCT).
4. The cup as defined in claims 1 - 12 is industrial applicable.
Consequently, the application satisfies the criterion set forth in Article 33(4) PCT.
5. The independent claim 1 is not drafted in the two-part form, contrary to Rule 6.3(b) PCT.
6. The features of the claims are not provided with reference signs placed in parentheses, contrary to Rule 6.2(b) PCT.
7. Document US-A-3 102 651 is not identified in the description, contrary to Rule 5.1(a)(ii) PCT.

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PRW/P54514W0	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 03055	International filing date (day/month/year) 08/08/2000	(Earliest) Priority Date (day/month/year) 14/08/1999
Applicant ROYAL INDUSTRIES (THAILAND) PLC et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.
☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1, 2

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 00/ 03055

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The abstract is changed as follows:

Line 1,2 and 3: after "lid" insert "(10)";
line 1,2 and 4: after "spout" insert "(14)";
line 2 and 3: after "passage" insert "(20)";
line 3: after "member" insert "(18)".

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03055

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A47G19/22 B65D47/18

*According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47G B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 102 651 A (BOESE) 3 September 1963 (1963-09-03) column 3, line 7 -column 4, line 58; figures ---	1-9, 11, 12
X	GB 2 317 608 A (FLYNN MICHAEL JOHN) 1 April 1998 (1998-04-01) page 4, last paragraph -page 8, last paragraph; figures ---	1-3, 7-9, 11, 12
X	US 4 915 250 A (HAYES JR GEORGE W) 10 April 1990 (1990-04-10) column 3, line 63 -column 6, line 9; figures ---	1-3, 7-9, 11, 12
A	EP 0 099 964 A (HENKEL KGAA) 8 February 1984 (1984-02-08) --- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

8 December 2000

Date of mailing of the international search report

18/12/2000

Name and mailing address of the ISA

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NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Vistisen, L

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03055

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 757 391 A (COKE) 12 April 1904 (1904-04-12) -----</p>	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/03055

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3102651	A	03-09-1963	NONE	
GB 2317608	A	01-04-1998	NONE	
US 4915250	A	10-04-1990	US 4795052 A EP 0305067 A JP 1121010 A	03-01-1989 01-03-1989 12-05-1989
EP 0099964	A	08-02-1984	DE 3217396 A AT 18696 T DE 3362585 D ES 279949 U ES 283082 U	10-11-1983 15-04-1986 24-04-1986 01-06-1985 01-04-1985
US 757391	A		NONE	

INTERNATIONAL SEARCH REPORT

Intern 1st Application No

PCT/G8 00/03055

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A47G19/22 B65D47/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47G B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 102 651 A (BOESE) 3 September 1963 (1963-09-03) column 3, line 7 -column 4, line 58; figures	1-9, 11, 12
X	GB 2 317 608 A (FLYNN MICHAEL JOHN) 1 April 1998 (1998-04-01) page 4, last paragraph -page 8, last paragraph; figures	1-3, 7-9, 11, 12
X	US 4 915 250 A (HAYES JR GEORGE W) 10 April 1990 (1990-04-10) column 3, line 63 -column 6, line 9; figures	1-3, 7-9, 11, 12
A	EP 0 099 964 A (HENKEL KGAA) 8 February 1984 (1984-02-08) -/-	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *Z* document member of the same patent family

Date of the actual completion of the international search

8 December 2000

Date of mailing of the international search report

18/12/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
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Fax (+31-70) 340-3018

Authorized officer

Vistisen, L

INTERNATIONAL SEARCH REPORT

Interv 1st Application No
PCT/GB 00/03055

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 757 391 A (COKE) 12 April 1904 (1904-04-12)	

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat'l Application No

PCT/GB 00/03055

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3102651	A	03-09-1963	NONE
GB 2317608	A	01-04-1998	NONE
US 4915250	A	10-04-1990	US 4795052 A 03-01-1989 EP 0305067 A 01-03-1989 JP 1121010 A 12-05-1989
EP 0099964	A	08-02-1984	DE 3217396 A 10-11-1983 AT 18696 T 15-04-1986 DE 3362585 D 24-04-1986 ES 279949 U 01-06-1985 ES 283082 U 01-04-1985
US 757391	A	NONE	

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
22 February 2001 (22.02.2001)

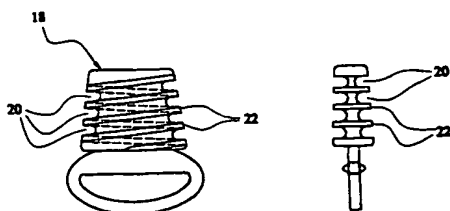
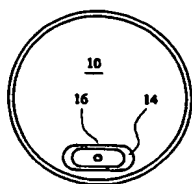
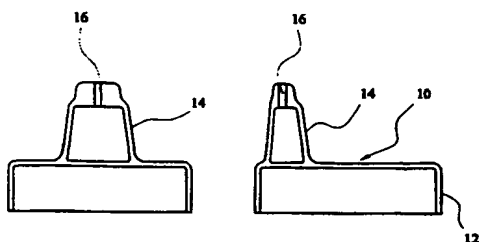
PCT

(10) International Publication Number
WO 01/12031 A1

- (51) International Patent Classification⁷: **A47G 19/22, B65D 47/18**
- (21) International Application Number: **PCT/GB00/03055**
- (22) International Filing Date: **8 August 2000 (08.08.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
9919133.0 14 August 1999 (14.08.1999) GB
- (71) Applicant (for all designated States except US): **ROYAL INDUSTRIES (THAILAND) PLC [TH/TH]; 126 Moo Sethakiji I Road, Omnoi, Krathumban, Samuthsakorn 74130 (TH).**
- (72) Inventor: **SAMSON, Ian [IL/GB]; 8A Chesterford Gardens, London NW3 7DE (GB).**
- (74) Agent: **WHARTON, Peter, Robert: Urquhart-Dykes & Lord, Tower House, Merrion Way, Leeds LS2 8PA (GB).**
- (81) Designated States (*national*): **AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.**
- (84) Designated States (*regional*): **ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,**

[Continued on next page]

(54) Title: **SPILL-PROOF CUP**



(57) Abstract: A cup is disclosed which includes: a sealingly engageable lid (10) having a drinking spout (14) located thereon, a tubular passage (20) formed between inner surface of the lid (10) and/or spout (14) and a detachable member (18) located on the lid (10), the passage (20) having one end in communication with the inside of the cup and the other end in communication with the outside of the spout (14) and being of such a diameter such that air cannot readily bubble past liquid inside it. When such a cup is inverted, the head of liquid inside lowers the pressure of the air above the liquid, and liquid therefore starts to move downwardly through the passage. This continues until the reduction in air pressure above the liquid just balances the pressure of the liquid head, when further movement of liquid ceases. (The fact that air cannot bubble past the liquid in the passage ensures that the air pressure is not restored while the cup is inverted or reclined). Thus the capacity of the passage should be great enough to contain this amount of liquid without reaching the exit and therefore spilling.

WO 01/12031 A1



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *With international search report.*
- *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

SPILL-PROOF CUP

This invention relates to spill-proof cups and in particular relates to such cups for use by babies or children and the infirm.

The need for spill-proof cups is well known; these are cups with an air-tight lid and a spout which are designed not to leak when the cup is held in a tilted or overturned position by a child, or when the cup falls on its side or even turns over. There are various designs serving this purpose, and these can be broadly divided into four groups:

- a) those requiring some deliberate action to close. These suffer from the obvious disadvantage that the baby/child cannot be relied on to operate the closure.
- b) Self-sealing, containing a valve. These suffer from the general problem in that the use of the valve is 'wrong' in the sense that the direction in which, in one situation, the flow is supposed to be blocked is the same direction in which, in another situation, the flow is desired. Therefore these valves are either not efficient in blocking the leaks, or they offer an undesirable level of resistance to suction. Many also contain areas which are difficult to clean, and others also contain many components which make the cup expensive.
- c) Where an obstruction that covers the exit is pulled away by the suction applied by the drinker. However, this is prone to the venturi effect which tends to partially re-obstruct the exit and possibly induce oscillatory instability.
- d) Flow restraint, without a valve, with which the present invention is concerned.

US 4,795,052 and US 4,915,250 describe two similar versions of such a cup. It contains an airtight lid with a spout. The inside aperture of the spout communicates with the interior of the cup by way of a tubular 'chamber' which is disposed in the lid, starts and ends near the spout, and runs (generally along the rim of the lid) from the first half of the lid to the second half of the lid and back again, so that, as specified in US 4,915,250, when the cup is tilted liquid exiting the cup through said tubular chamber would have to rise above the level of the liquid in the container. This can only happen when the liquid is being sucked out, and thus leakage is prevented even when the cup lies on its side. US 4,795,052 specifies another

-2-

similar passage between the inside and outside to act as a vent. This eases the suction somewhat but has other disadvantages.

The disadvantage of this arrangement in any practically utilizable form (for example in the product known as the ANSA cup, which uses a tube that is attached to the inside of the spout and runs round along the inside of the rim) is that the inside of this tube cannot be cleaned in a way that is considered necessary for baby feeding equipment: that is, for all surfaces to be accessible to mechanical cleaning action, e.g. by means of a brush or even the finger, especially when milk etc. has solidified inside.

The above mentioned US patents describe a lid with the chamber as a fabrication of two plates, one upper and one lower. This however would either be permanently sealed with the inside of the chamber inaccessible for cleaning, or if detachable it would be impractical to disassemble and reassemble regularly by the user such that the chamber, as disclosed there, is totally sealed everywhere other than at its free end. As noted above, in practice, a tube is used and this is inaccessible to cleaning also.

The present invention seeks to provide a cup improved in the above respects, which is easy to use, spill-proof and easy to clean even when used with solidifiable liquids such as milk.

According to the present invention there is provided a cup including: a sealingly engageable lid having a drinking spout located thereon, a tubular passage formed between inner surface of the lid and/or spout and a detachable member located on the lid, the passage having one end in communication with the inside of the cup and the other end in communication with the outside of the spout and being of such a diameter such that air cannot readily bubble past liquid inside it.

When such a cup is inverted, liquid starts to move downwardly into the passage and the locked air above the liquid expands, thus lowering the pressure. This continues until an amount of liquid has entered the passage with the associated pressure reduction in the air above the liquid just balancing the pressure of the liquid head, upon which further movement of liquid ceases. (The fact that air cannot bubble past the liquid in the passage ensures that the air pressure is

-3-

not restored while the cup is inverted or reclined.) Thus the capacity of the passage should be great enough to contain this amount of liquid without reaching the exit and therefore spilling.

Although there will be variations for cups of non-cylindrical shapes, in principle the volume increase (in cc) to give the reduction in air pressure to support a given head of liquid (e.g. water) is given by: $H \times V$, where V is the volume (in litres) of air inside the cup, and, with the cup inverted, H is the height (in cm) of the water level above the exit of the spout. This varies according to the water level, but usually at a maximum with cup about half full. Thus, in the preferred form of the invention, the volume of the passage is greater than the maximum value of $H \times V$.

The spout is preferably tapered so easily to receive the detachable member, and is preferably conical, most preferably in the form of a truncated cone. The detachable member is preferably in the form of a plug which fits into the inside of the spout and is sealingly engaged thereto, e.g. by an interference fit. The plug will generally therefore have the same or similar outside configuration as the inside of the spout. The plug preferably has an elongate channel on its surface which, in cooperation with the inside of the spout, forms the passage. However, the channel could instead be formed on the inside of the spout or on both the spout and the plug, or indeed between two or more parts which make up the plug. In any event, the plug is easily removable and replaceable by a user, enabling the inside of the passage to be exposed for mechanical cleaning thereof. It is usually more convenient, and therefore cheaper, to manufacture the device with the channel formed in the plug. This is also better for cleaning purposes. The plug is preferably made from a resiliently compressible material, such as an elastomer, and may advantageously be moulded therefrom.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates the lid of a drinking cup in side elevation (a), end elevation (b) and bottom plan (c) views;

-4-

Figure 2 shows the plug of the invention in side (a) and end (b) elevation;

Figure 3 is a diagrammatic side view of a typical cup and lid;

Figure 4 is a similar view to figure 1 (b) of second embodiment of the invention; and

Figure 5 (a) is a similar view to Figure 2(a) of the second embodiment, and (b) is a bottom elevation.

Referring to the drawings, and in particular Figures 1 and 2, a lid 10 has sides 12 which are sealingly engagable with a cup in a manner known *per se*. The lid has a spout 14 located eccentrically so as to be convenient for drinking from. The spout 14 is in the shape of a truncated cone, preferably flattened (i.e. with an oval cross-section), and with a small bore 16 at the top. A detachable member, in the form of a plug 18 moulded from an elastomer, has a helical channel 20 around its exterior surface and it also has an outline matching the inside of the spout's cavity. The ridges 22 between respective channel portions are such as to make sealable contact with the inside surface of the spout's cavity. The top end of the channel 20 is in communication with the bore 16 in the top of the spout, and therefore the outside of the cup, and the bottom of the channel communicates, in use, with the interior of the cup.

Preferably the lower (wider) end of the plug 18 has integrally formed or attached to it a downward pointing extension, for instance in the form of a tab or a ring 24, with which the plug can be pulled out of the spout cavity for cleaning. This also adds to the size of the plug as a whole to conform with regulations governing the minimum size of objects which a baby might introduce into its mouth. When the plug is inserted into the spout's cavity, a tubular passage is formed by the channel 20 which is sealed everywhere except at its two ends. The diameter of the passage is such that air is prevented from entering past the liquid, for example a maximum diameter of approximately 3mm. When the cup is inverted, liquid starts to enter the tubular passage, thus causing the air inside the cup to expand and thus reduce in pressure. When the sub-pressure thus created inside the cup equals the pressure of the water-head between the upper level of the liquid and the lowest point that it reaches in the tubular passage, the ingress of liquid into the passage ceases. The volume of the canal is such that at this point

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the liquid has not yet reached the outlet of the bore 16. Preferably, the volume of the passage should be somewhat larger so as to absorb the effect of downward shaking of the cup. For example, for a 200cc cup of typical shape, the volume of the passage would be approx. 1.2c.c. When the cup is returned to the upright position the sub-pressure retracts the liquid in the passage ready for the next inversion.

Referring now to Figure 3, a 250 c.c. cup 24 is shown of typical shape, having the lid 10 and spout 14, the latter containing the plug of the invention. It is illustrated inverted, with a water level of height H cm above the spout bore 16, and an air space of volume V.

The height H and volume V for various fill levels for the above cup are given in the table below:

H (cm) of water	V (litres) of air	Min. passage vol. HxV (cc)
4.0	0.226	0.905
5.0	0.195	0.975
5.5	0.180	0.991
6.0	0.165	0.993
6.5	0.151	0.983
7.0	0.137	0.962
8.0	0.111	0.886

As can be seen from the above table, the greatest volume at approximately half full is 0.993 cc. Accordingly, in order to allow some leeway as described above, a passage capacity of 1.2 cc might be employed. If the passage is of the maximum 3mm diameter, its cross sectional area would be approx. 0.07cm^2 , so for a volume of 1.2 cc its length would need to be about 17 cm. This is easily achieved with a helically formed channel 20 on the plug 18. The configuration of the passage does not need to be helical but can be any shape that is convenient

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and yet allows the relevant length to be achieved. A helical channel is a very compact and convenient way of doing this.

Referring now to Figures 4 and 5, and using like numerals for like parts, the spout 14 in this case is a tilted truncated cone. In a particular example, the wall thickness of the cone is 1.5mm, with an outside diameter at the top of 13mm. The plug 18 is in the form of a hollow truncated cone also, with a helical channel 20 about its exterior as before. The bottom of the plug 18 terminates in a hollow cylindrical portion 26 which provides a grip for removing the plug from the spout 18. The cylindrical grip 26 may have segments 28 cut out to further lighten it and avoid liquid being trapped inside when the cup is inverted. Other forms of grip could be used.

In this example, the height of the plug is 27mm, its outside diameter at the top is 10mm and its OD at the bottom 21mm. The width of the channel is approx. 3.2mm, the width of the ridges between the channels is approx. 1.2mm and the number of turns is approx. 5, to give the necessary channel length. The cone half angle is approx. 11.7° .

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CLAIMS

1. A cup comprising a sealingly engageable lid having a drinking spout located thereon, a tubular passage formed between inner surface of the lid and/or spout and a detachable member located on the lid, the passage having one end in communication with the inside of the cup and the other end in communication with the outside of the spout and being of such a diameter such that air cannot readily bubble past liquid inside it.
2. A cup as claimed in claim 1 wherein the capacity of the passage is great enough to contain liquid without any of it reaching the exit and therefore spilling.
3. A cup as claimed in either of claims 1 or 2 wherein the volume of the passage is greater than the maximum value of $H \times V$ as hereinbefore defined.
4. A cup as claimed in any of claims 1 to 3 in which the detachable member is in the form of a plug which fits into the inside of the spout and is sealingly engaged thereto, e.g. by an interference fit.
5. A cup as claimed in claim 4 in which the plug has an elongate channel on its surface which, in cooperation with the inside of the spout forms the passage.
6. A cup as claimed in claim 4 in which the channel is formed on the inside of the spout or on both the spout and the plug.
7. A cup as claimed in any of claims 1 to 6 in which the plug is easily removable and replaceable by a user, enabling the inside of the passage to be exposed for mechanical cleaning thereof.
8. A cup as claimed in any of claims 1 to 7 in which the plug is made from a resiliently compressible material, such as an elastomer.

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9. A cup as claimed in any of claims 1 to 8 wherein the lid has a spout located eccentrically so as to be convenient for drinking from.

10. A cup as claimed in claim 9 wherein the spout is in the shape of a truncated cone, with a small bore at the top, and a detachable member, in the form of a plug, has a helical channel around its exterior surface and it also has an outline matching the inside of the spout's cavity.

11. A cup as claimed in any of claims 1 to 10 wherein the diameter of the passage is such that air is prevented from entering past the liquid, for example a maximum diameter of approximately 3mm.

12. A cup as claimed in any of claims 1 to 11 having a capacity of 200cc wherein the capacity of the passage is about 1.2 cc.

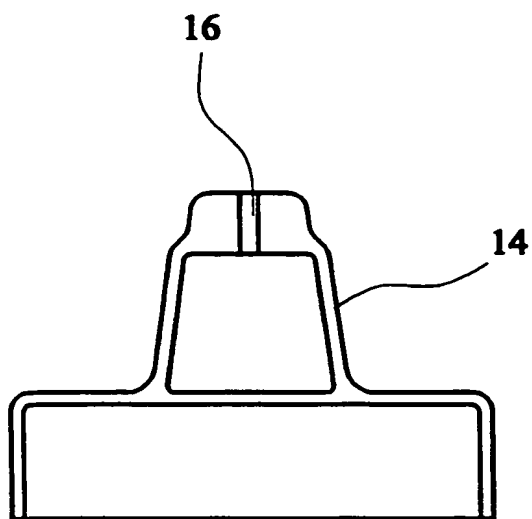


FIG. 1(a)

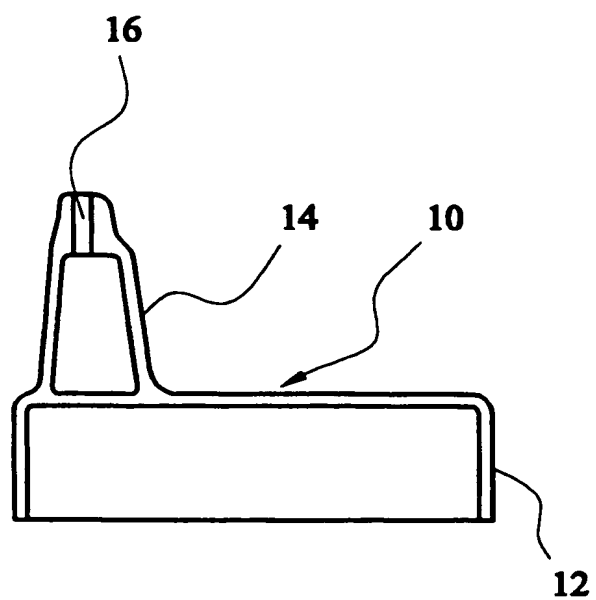


FIG. 1(b)

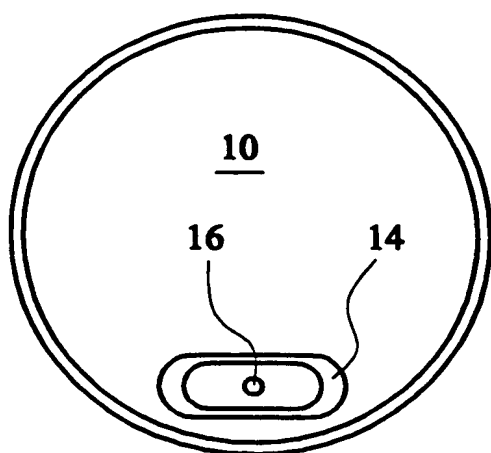


FIG. 1(c)

-2/3-

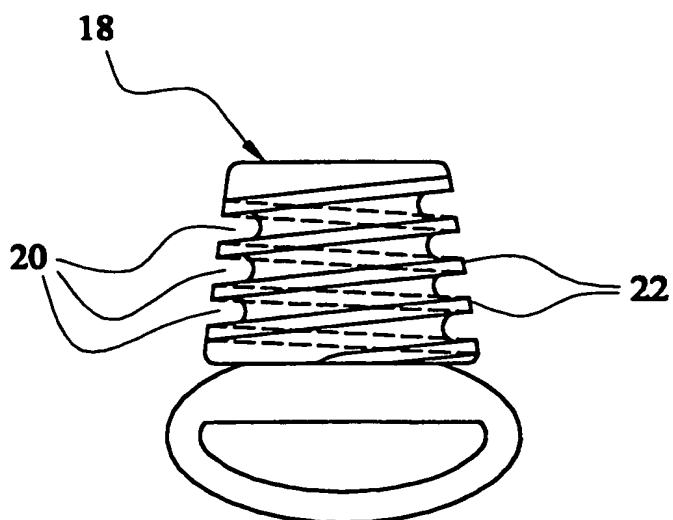


FIG. 2(a)

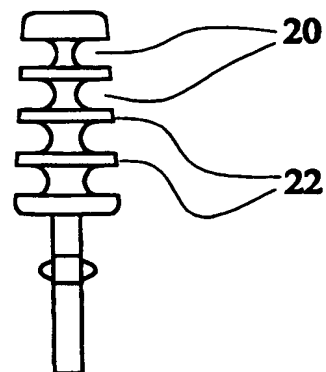


FIG. 2(b)

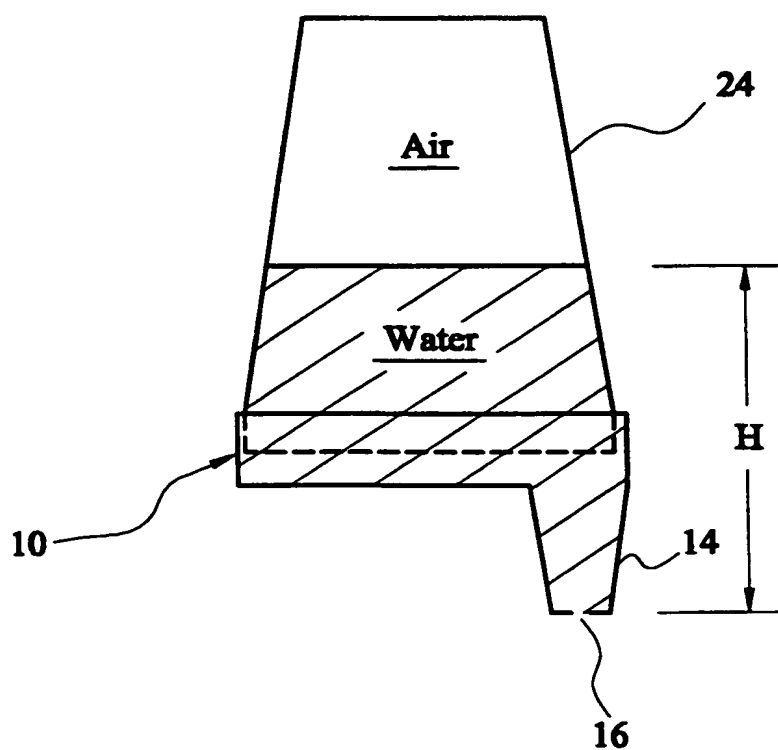


FIG. 3

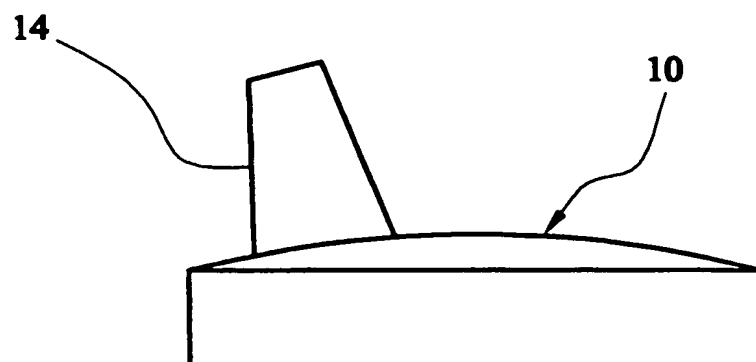


FIG. 4

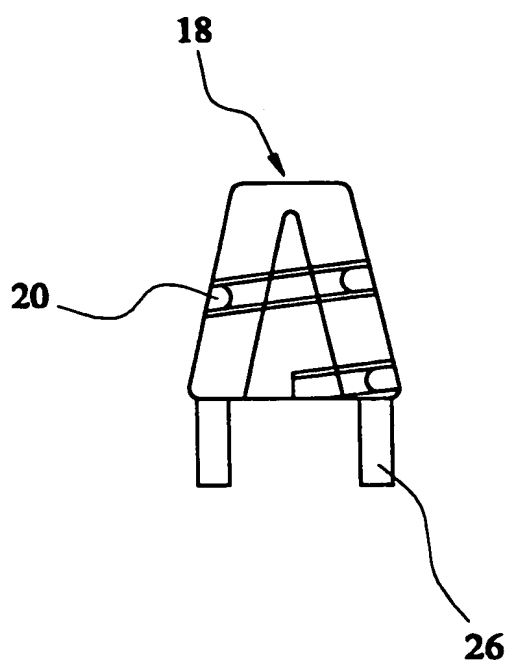


FIG. 5(a)

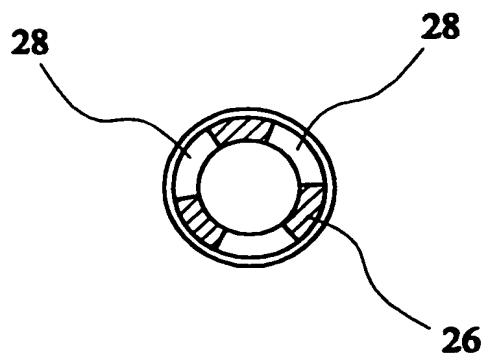


FIG. 5(b)

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03055

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47G19/22 B65D47/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47G B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 102 651 A (BOESE) 3 September 1963 (1963-09-03) column 3, line 7 -column 4, line 58; figures	1-9, 11, 12
X	GB 2 317 608 A (FLYNN MICHAEL JOHN) 1 April 1998 (1998-04-01) page 4, last paragraph -page 8, last paragraph; figures	1-3, 7-9, 11, 12
X	US 4 915 250 A (HAYES JR GEORGE W) 10 April 1990 (1990-04-10) column 3, line 63 -column 6, line 9; figures	1-3, 7-9, 11, 12
A	EP 0 099 964 A (HENKEL KGAA) 8 February 1984 (1984-02-08)	

☒ Further documents are listed in the continuation of box C.

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INTERNATIONAL SEARCH REPORT

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PCT/GB 00/03055

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 757 391 A (COKE) 12 April 1904 (1904-04-12) -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/03055

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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